2.7 Connecting X-Intercepts and Factors

Recall:

- The x-intercepts are where the graph crosses the x-axis.
- They are also called zeros, roots or solutions.
- They are the points where the y=0.

Factored form is the easiest form to find the solutions

Ex: Is -3 an x-intercept (zero) of the Function $f(x) = 2x^2 + 5x - 3$?

$0 = 2x^2 + 5x - 3$

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-6 +5 +6 -1

$= (x+3)(2x-1)$

$x+3=0$ or $2x-1=0$

$x=-3$ or $2x=1$

$\frac{2x}{2} = \frac{1}{2}$

$x = \frac{1}{2}$

∴ -3 is an x-intercept

Hint

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Factored Form: $y = a(x - r)(x - s)$
the zeros/x-intercepts/roots/solutions are r and s
To find the zeros set f(x) = 0
then we can find the zeros by setting each factor = 0 and solving

Ex.1 Find the zeros.

a) $f(x) = (x - 4)(x + 3)$

$x-4=0$ or $x+3=0$

$x=4$ $x=-3$

$(4, 0)$

b) $y = -2(x + 5)(x - 5)$

$x+5=0$ or $x-5=0$

$x=-5$ or $x=5$

c) $y = -4(x + 1)^2$

$x+1=0$

$x=-1$

d) $f(x) = (3x)(x - 2)$

$3x=0$ or $x-2=0$

$x=0$ $x=2$

e) $f(x) = (2x - 1)(3x + 4)$

$2x-1=0$ or $3x+4=0$

$\frac{2x}{2} = \frac{1}{2}$ $\frac{3x}{3} = \frac{-4}{3}$

$x = \frac{1}{2}$ $x = -\frac{4}{3}$

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Ex. 2 Solve by factoring.

1. Set = 0
2. Factor
3. State solutions

$-4+4=x^2+6x+8-4$

$0=x^2+6x+4$

Recall

a) $y = x^2 + 6x + 8$

$0=x^2+6x+8$

$0=(x+4)(x+2)$

$x=-4$ or $x=-2$

b) $y = -x^2 - 2x + 15$

$0=-x^2-2x+15$

$0=-(x^2+2x-15)$

$0=-(x-3)(x+5)$

$x=3$ $x=-5$

c) $y = 3x^2 + 12x + 12$

$=3(x^2+4x+4)$

$=3(x+2)(x+2)$

$y=-2$

d) $y = 2x^2 - 18$

$=2(x^2-9)$

$=2(x-3)(x+3)$

$x=3$ or $x=-3$

e) $y = 3x^2 + 6x$

$=3x(x+2)$

$3x=0$ or $x+2=0$

$x=0$ $x=-2$

f) $y = 1.4x^2 - 9.8x + 16.8$

$0=1.4(x^2-7x+12)$

$=1.4(x-3)(x-4)$

$x-3=0$ or $x-4=0$

$x=3$ $x=4$

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Ex 3 Solve

$x^2 - 144 = 0$

Method 1

$(x-12)(x+12)$

$x-12=0$ $x+12=0$

$x=12$ $x=-12$

Method 2

$x^2-144=0$

$\sqrt{x^2}=\sqrt{144}$

$x=\pm 12$

Ex 4 Solve

$x^2 + 3x + 10 = 3x^2 - 4x - 5$

$x^2-3x^2+3x+4x+10+5=0$

$-2x^2+7x+15=0$

Ex 5 Solve

$3x(x-2) = 4x(x+1)$

$-1(2x^2-7x-15)=0$

M A N

-30 -7 $-10+3$

$\frac{-10}{2}$ $\frac{3}{2}$

$-1(x-5)(2x+3)$

-5 $\frac{3}{2}$

1 2

Ex 6 Solve

$(x+3)(x-1) = 2(x-5)(x+3)$

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How can you tell if the equation is factored or not???

Factored	Not Factored
Just state sol'ns from factored form	more work must expand, simplify rearrange then factor and state soln's . OR if in vertex form set = 0 then isolate x

$3x(x-2) = 4x(x+1)$

$f(x) = -7(x-2)^2$

$y = -2(x+5)(x-5)$

$f(x) = -2(x-8)^2 + 32$

$f(x) = 3x(x-2)$

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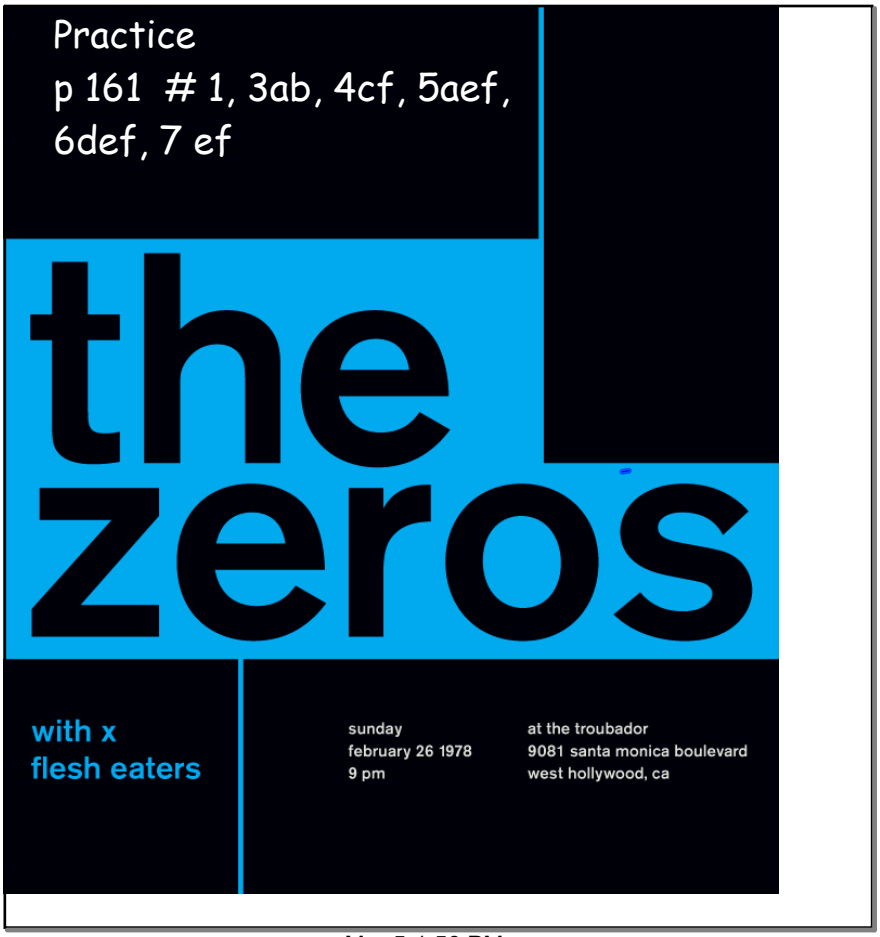
Practice
p 161 # 1, 3ab, 4cf, 5aef, 6def, 7 ef



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